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Mr. Arthur C. Garceau, Project Manager
Superfund Section
Office of Environmental Response
Indiana Department of Environmental Management
100 North Senate Avenue
P.O. Box 6015
Indianapolis, Indiana 46206-6015

Subject: Response to Comments Draft
Final Baseline Risk Assessment
for the Continental Steel Superfund Site

Dear Mr. Garceau:

Camp Dresser & McKee Inc. (CDM) has completed the revisions to the Draft Final Baseline Risk Assessment based on the comments received from the Indiana Department of Environmental Management (IDEM) on December 20, 1996. Responses to all General Comments and Specific Comments provided by the IDEM have been incorporated. A separate written response to the U.S. Environmental Protection Agency (U.S. EPA) comments are provided as an attachment to this letter. CDM has provided this separate response to each comment from the U.S. EPA to facilitate the final review and approval since these comments required significant changes to the final report.

We look forward to your approval of the Final Baseline Risk Assessment submitted this date.

Sincerely,

CAMP DRESSER & McKEE INC.

Mark A. Burgess, P.E., DEE
Principal Engineer

cc: Jon Peterson w/attachment

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Response to U.S. EPA Comments Dated November 18, 1996 for the Draft Baseline Risk Assessment Continental Steel Superfund Site Kokomo, Indiana

Executive Summary

Comment

The Baseline Risk Assessment is an unbiased evaluation of the risk posed by exposure to contaminants at the site to selected populations of concern. The risk management suggestions included in this summary are inappropriate in a risk assessment, and should be removed. The executive summary should describe the receptor population and contaminants evaluated for the different areas of the site and the risk levels calculated for these contaminants and receptors. It should not make suggestions about how the site should be managed.

Answer

The executive summary has been revised. Additional information regarding risk levels for different receptors has been added and risk management discussions have been removed.

Comment

The many comments in this section which state that Hazard Quotients (HIs) which exceed unity "only suggest a small impact on health" are not correct. Values greater than 1.0 indicate that an acceptable exposure level or intake for a set of contaminants is exceeded. A chemical specific Hazard Quotient (HQ) of 1.6, for example, does not strictly mean that the acceptable exposure level is exceeded by 60%, nor does a HQ of 3.0 mean that the risk of adverse health effects is 300%. A HQ or HI greater than 1.0 only indicates that the exposure is unacceptable and that the potential for adverse health effects from this exposure exists; this is an on/off, yes/no trigger value. The ratio value expressed by the HQ/HI should never be interpreted as a probability. The level of concern does not increase linearly as the value of unity is exceeded. All such interpretations seen in this report should be avoided, and the likelihood of adverse noncarcinogenic health effects simply reported as existing (HI/HQ of 1.0 exceeded) or not existing (HI/HQ less than 1.0).

Answer

In accordance with the comment, the final BRA states that there is a potential for adverse effects in cases where an HQ or an HI is greater than 1, no further interpretation is provided. CDM agrees that the ratio exposure level/Reference Dose (RfD) (i.e., HQ or HI) should not be interpreted as a statistical probability for the potential of adverse effects. It is important to note that the RfD is considered a level of exposure below which it is unlikely for sensitive

populations to experience adverse health effects and exposure to noncarcinogens is generally characterized by a dose response curve. It would follow that the level of concern generally increases with the magnitude of the HI or HQ (refer to the Risk Assessment Guidance for Superfund (RAGS), page 8-11). It seems reasonable to conclude that if the HI for a conservative exposure scenario is only slightly above unity, the risk for adverse health effects to occur is also small.

Comment

The development of remediation goals is not strictly part of the risk assessment process, and this section more properly belongs in a separate document. The development of remediation goals includes more than just the risk characterization, and the consideration of ARARs and other non-health based criteria plays a part in the development of appropriate values for the site. It is presumptuous to exclude these criteria from the process.

Answer

CDM did not exclude ARARs and other non-health based criteria in the selection of remediation goals. ARARs and other non-health based criteria were presented and discussed in the Draft FS. To facilitate flow of information between the BRA and the FS, some discussion of ARARs was also included in the development of health-based remediation goals in the Draft BRA (e.g., the Draft BRA recommended using MCLs instead of health-based values for groundwater). CDM agrees that selection of remediation goals for the CSSS is best presented in one coherent section. Selection of remediation goals will include discussion of all applicable standards and criteria (i.e., health-based and other) and will be presented in the final FS.

Section 1: Introduction

Comment

Section 1.0, Purpose of the Report, para.1, clearly states that remedial options will be addressed in the FS report. Why then does this report pre-empt the remedial options discussion by suggesting remedial strategies for the individual exposure units?

Answer

Discussion of remedial options have been removed from the final BRA.

Section 3: Data Evaluation and Selection of Chemicals of Potential Concern

Comment

It is very disconcerting that different depths of surface and subsurface soils were collected in the different exposure units. The definition of surface soil for risk assessment purposes is the top 6 inches of soil for most COPCs and 2 cm (or more practically, 2 inches) for lead exposure assessments. Not only does the depth of the "surface soil samples differ by exposure unit, it is implausible to assume that incidental ingestion or dermal contact occurs at 4 feet. There is also question as to whether the site surface exposure estimate is statistically diluted by the use of a deep sample. No justification is given for the plausible use of such samples in

this manner (e.g., soil is fill and expected to be homogeneous down to 4 feet). The report should include some discussion as to why the use of a 4 foot sample is acceptable for the exposure pathways being considered, and why the use of a sample from lesser depths is more appropriate in other exposure units.

Answer

CDM agrees that the available "surface" soil data for the CSSS are not highly representative of the exposures to be evaluated at the site and that there is some uncertainty associated with the lack of true surface soil data for the CSSS. This is discussed by source area below.

Markland Avenue Quarry and Slag Processing Area

At the Markland Avenue Quarry and the Slag Processing Area, samples were collected from the top 1 foot of soil and from a depth of 4 to 14 inches, respectively. Since much of the soil at these sites consists of fill material, no great variation in chemical concentrations is expected over the top 1 foot of soil, and the data are considered adequate for evaluation of potential exposures to surface soil. Uncertainties associated with using these data are considered low.

Main Plant

At the Main Plant most of the data used to calculate exposure point concentrations for surface soil were composited from a depth of 0 to 4 feet. Only three samples were collected from a depth of 0 to 8 feet. In the absence of true surface soil data for the Main Plant, these data were used in the BRA. Much of the soil at the Main Plant consists of fill material, variation with depth is therefore expected to be less than if no fill were present. It is not known, if and how the available data would differ from true surface soil data for the Main Plant. The degree of uncertainty associated with the data used to evaluate potential exposures to surface soil at the Main Plant is therefore relatively large.

Lagoon Area

Potential exposures to surface soil at the Lagoon Area are evaluated using data from three different types of materials: soil, sludge, and waste piles. Soil samples were collected from a depth interval of 0 to 16 feet, sludges from a depth of 0 to 2 feet, and waste pile materials from near the surface of the waste piles. Sludges are expected to be reasonably well mixed over a depth of 2 feet and little uncertainty is associated with use of these data. Soil samples are generally not representative of the exposures evaluated, and use of these data is associated with some uncertainty. Soil at the Lagoon Area consists of fill, however, and since disposal practices in this area have been relatively consistent over time, great variation in contaminant concentrations is not expected with depth. Since the soil data are combined with data from other materials which have a higher degree of representativeness, and since most soil at the Lagoon Area consists of fill, uncertainties associated with the soil data are considered only low to moderate.

Comment

In Section 3.4.1 - Additional Evaluation of Arsenic as a COPC in Soil, it is suggested that a 10^{-4} target risk should be used for arsenic. This appears to be a risk management decision, which must be weighed after reviewing all site risks. The section did lead to an examination of the background data for arsenic in surface soil in the Background Technical Memorandum (Appendix B). A review of the arsenic background data raises some further questions. It is not clear why the four presamples collected on 11/6 show much higher arsenic levels than the background samples collected on 11/15 or the earlier samples collected in 1993. The arsenic concentration range in these samples is 3.3 to 25.5 mg/kg, well below the levels found in some exposure units. It is the elevated levels in the presamples which approach site arsenic concentrations. Some further examination of the soil arsenic background is clearly needed before arsenic is eliminated from any exposure units or any risk management decisions are made based on a comparison with background. The figures illustrating the sampling locations are not included in this document, and should be included.

Answer

Risk management suggestions have been removed to the appropriate section in the FS. The arsenic data used are considered appropriate for delineating background concentrations. A statistical analysis was conducted to evaluate whether any of the arsenic data consisted of outliers, the analysis showed that no outliers were present and that all data were useable.

More detailed information regarding statistical analyses performed has been added to the text in the BRA in Section 3. Background sampling locations are presented in the Technical Background Memorandum which is attached as Appendix B to the BRA.

Comment

In Section 3.5.1, Calculation of the Exposure Point Concentrations, first para., the text indicates that the upper 95 percent confidence limit (UCL) on the arithmetic concentration within an exposure unit is used for the RME exposure scenarios, while the simple arithmetic average (mean) is used for the Central Tendency Exposure (CTE) scenarios. This is repeated in Section 3.5.1.2. This makes no sense. The rationale behind the use of the 95 percent UCL value is the uncertainty associated with the estimate of the true average concentration of contaminants at the site and the need to provide reasonable confidence in the concentration estimate used in the risk assessment. The contaminant concentration estimates should not be less certain (more sloppy) in the CTE calculations. The same exposure point concentration values (i.e., the 95 percent UCL value should be used in both scenarios. The difference between the exposure scenarios should reasonably reflect the exposure differences, not the sampling and analytical error in the estimate of the sample concentration. The CTE scenarios can thus be expected to be systematically biased low (underestimated) in this risk assessment. In some case, the RME risks may be

based on the use of the maximum contaminant level for the exposure area. This is usually an indication of other problems in the data set.

Answer

Interpretation of the concentration term is still left to professional judgement in many regions. U.S. EPA's Supplemental Guidance to RAGS "Calculating the Concentration Term" (1992) states only that "RME and average should both use an average concentration. Because of the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit on the mean (UCL) of the arithmetic mean should be used for this variable. The RME is intended to account for both uncertainty in the contaminant concentration and variability in exposure parameters." According to U.S. EPA 's (1992) Implementing the Deputy Administrator's Risk Characterization Memorandum, the purpose of the central tendency estimate is to be used for informational purposes in discussing uncertainties. Since the difference between the average concentration term and the UCL on the mean is an important measure of uncertainty in a risk assessment, it appears that more information on uncertainties can be gained by using an average concentration in the evaluation of average exposures.

U.S. EPA Region V advocates using the 95 percent UCL for evaluation of both, average exposure and RME. Since risk based on RME is used for decisionmaking purposes in the Superfund Program, U.S. EPA agreed that it would not be necessary to recalculate average exposures using the 95 percent UCL as the concentration term for the final BRA for the CSSS.

Comment

In the same section, second paragraph, it is not certain what is meant by the "detection limit." RAGS guidance specifies the use of one-half of the Sample Quantitation Limit (SQL) or the CRQL, if the SQL is not provided, for non-detects (see Section 5.3.4 in RAGS). Because the true detection limit is usually about one-third of the quantitation limit for most analytical methodologies, it is unclear why this value would be the value of choice in this assessment. It is possible that this is a semantics error, and that the CRQL was actually used. The use of one-half the detection limit in place of one-half the sample quantitation limit or the CRQL can be expected to systematically bias the risk assessment low.

Answer

Use of the term "detection limit" in the risk assessment was a semantics error. Exposure point concentrations for the CSSS were calculated according to RAGS guidelines (i.e., using the one half of the CRQL for nondetects). The text will be corrected accordingly.

Comment

On page 28, third paragraph., it is not clear from the text discussions exactly how well contaminant concentrations were averaged within wells and between wells. Some further discussion is needed here.

Answer

The statement in the text that contaminant concentrations were averaged between wells was incorrect and has been removed. Since exposures to groundwater are evaluated on a geographic or well by well basis, it was not necessary to average data between wells. Available data were, however, averaged for each well, and the average concentration for each COPC was used to estimate risks at each well.

Comment

On page 28, third para., this discussion of the averaging of the well data is not clear. Are two separate kinds of exposure point concentrations calculated? How is each used in the assessment?

Answer

Please see the response to the previous comment.

Comment

It is apparent that soil exposure point concentrations were developed for each source area/exposure area that are a 95% UCL of the mean value for the entire area, no matter how large the area is or how diverse the contaminant pattern may be. However, exposure units for consideration in the risk assessment are thought to be areas where the receptor has equal probability of exposure on a repeated basis over a long period of time. The calculation of one exposure point concentration when the exposure unit is 100 acres or even 23 acres, is not plausible for most adult exposure scenarios. It is certainly not plausible if the receptor is a child under the age of six. This is a particularly problematic issue at this site because the site contaminants exhibit a broad range of concentrations. Some parts of the site may be more heavily contaminated than other portions, and these areas may not be suitable for either residential or commercial/ industrial use if these soil concentrations persist. Some further evaluation of the spatial distribution of site contaminants in each exposure area and the effect on the receptor exposure is needed. The exposure point concentrations used in this assessment do not appear to be appropriate for this purpose.

Answer

CDM has completed a BRA for six different exposure units of the CSSS (Main Plant, Markland Avenue Quarry, Lagoon Area, Slag Processing Area, sitewide groundwater and Kokomo and Wildcat Creeks). For each of the exposure units a wide variety of populations and exposure pathways were evaluated. Breakdown into even smaller exposure units would have greatly increased the size and complexity of the assessment and was not considered practical. (An exception is made for lead. To evaluate potential exposures to lead each source area was further subdivided into smaller exposure units).

The final BRA has been expanded to evaluate any potential "hotspots" that may be present at the CSSS but could not be identified by evaluating each source area as a unit. The final BRA includes an evaluation of the variability of contaminant concentrations in the different source areas, and a comparison of exposure point concentrations used in the BRA to chemical concentrations in potential hot spot areas. This evaluation shows that there is generally little variability in contaminant concentrations across the source areas and that exposure point

concentrations used in the BRA are generally protective. Only one or two small hot spot areas were identified using this approach, these areas are qualitatively evaluated in the BRA.

Section 4: Exposure Assumptions and Exposure Pathways

Comment

An overall observation is that the separate assessment of the groundwater exposure, creek exposures, exposure area trespass exposures, worker exposures and present or future residential exposures does not allow for the evaluation of potential risk if the true receptor population exposure is actually a combination of several exposure scenarios. This could be considered a dilution of risk by division. It is still common to look at reasonable combinations of risks (the old maximally exposed individual logic), by using reasonable scenario combinations for some populations. What if future residents and/or commercial/industrial workers are exposed to both soil and water? What if the nearby resident is exposed at his residence and also trespasses on site? Are the contaminant concentrations still protective? Such an analysis in the risk assessment may provide the justification for certain risk management actions (e.g., zoning restrictions, prohibition of onsite wells, etc.)

Answer

Risks have been combined where appropriate in the BRA. For example, risks from soil ingestion and dermal contact with soil have been combined and several exposure pathways for groundwater have been evaluated and combined in the BRA. Risks from exposure to contaminated soils are generally much less than potential exposure to contaminated groundwater in the same areas. Since combining these risk estimates results in a total risk essentially the same as for groundwater, it was not considered necessary to add these risks. Likewise, adding potential risks for trespassers or recreational visitors to those from residential groundwater use would not significantly increase the risk.

The qualitative discussion regarding such exposures has been expanded in the final BRA to include more possible combinations.

Comment

On page 6, the section on Body Weight lists the average body weight for the young child as 16 kg and the reference as U.S. EPA 1991. Actually, the March 15, 1991 OSWER Directive #92285.6-03 lists the body weight for the small child as 15 kg, not 16 kg. Fifteen kg is the value listed in all subsequent U.S. EPA documents, and the value commonly used for children under the age of 6 in Region 5 risk assessments. The use of 16 kg introduces an inconsistency in the risk assessment. The use of a child body weight of 16 kg instead of 15 kg is expected to systemically bias the assessment of risks to children (all noncarcinogenic risk in this assessment) slightly low.